

Appln. No. 10/697,977
Amd. dated September 30, 2005
Reply to Office Action of July 6, 2005

REMARKS

The Examiner's action dated July 6, 2005, has been received, and its contents carefully noted.

In response to the requirement presented in section 1 on page 2 of the Action, submitted herewith is a copy of the Abstract that was intended to be submitted with the previous Amendment.

In response to the rejection presented in section 4 of the Action, claim 1 has been amended by deletion of the term "only" and claims 21-24 have been canceled. Accordingly, it is requested that this formal rejection be reconsidered and withdrawn.

Referring to the rejection presented in section 6 of the Action, it is noted that the rejected claims have been canceled. Since claims 1-10 were not rejected on the basis of prior art, it is not clear whether the Examiner considers those claims to distinguish patentably over the prior art. However, for the sake of completeness, claim 1 has been amended to more clearly define the contribution of the invention over the prior art relied upon in section 6 of the Action and it is submitted that claim 1 clearly distinguishes patentably over the references relied upon in the prior art rejection.

The present invention is directed to a device for the non-contact measurement of the position of the teeth of a workpiece with pre-cut teeth. The device, as defined in claim 1 is composed of a retractable measuring probe that is movable in a fixed swivel plane between a first measuring position and a second retracted position, the swivel plane being parallel to or coinciding with the rotary axis about which the workpiece is rotatable. The device further includes a double parallelogram linkage composed of two parallelogram linkages between which the swivel plane of the measuring probe is disposed, and a holder carrying the probe and arranged between and connecting the parallelogram linkages such that the probe is protected by the parallelogram linkages when in the fixed retracted position. Finally, the device includes a base member opposite the holder, the base member being rigidly connected to the machine bed or a work spindle housing.

Significant advantages of the invention reside in the provision of a double parallelogram linkage and in the arrangement of the holder carrying the probe such that the probe is protected by the parallelogram linkages when in its retracted position.

The provision of a double parallelogram linkage, particularly one having the characteristics now defined in claim 1, assures that the probe is incapable of any movement

in a direction perpendicular to the swivel plane and that the measuring probe will be movable into the measuring position with a high degree of accuracy and repeatability.

All of the features discussed above have been included in claim 1. Support for the recitations relating to the location of the swivel plane and the position of the probe when in the fixed retracted position will be found in the drawings as originally filed, as well as in the Specification, for example at page 6, lines 6-11.

These features are not disclosed in or suggested by any combination of the teachings of the applied references.

Pryor discloses a method and apparatus for electrooptically determining the dimension, location and attitude of objects. In the embodiment shown in Figure 16 of this reference, a 5-axis sensor head is mounted on a robot arm 301. This sensor head is capable of characterizing the entire location of a part 303 near a robot for the purpose of inspecting the part. The apparatus disclosed in this reference does not include a machine bed providing a rigid mechanical connection between the part 303 and the base of the robot arm.

Dalakian discloses an industrial robot for a machine tool welding and servicing operations, the robot having a rotary support and a mechanical arm with a gripper. The arm

is made up of two sections, each in the form of a parallelogram with lengthwise rods connected by an intermediate element in the form of a rectangle or trapezium. The two parallelograms are arranged one behind the other and both lie in the same swivel plane, meaning that they have different swivel axes. Parallelograms arranged in this manner cannot provide mechanical stability to the arm perpendicular to the swivel plane, and certainly not in the manner of the double parallelogram linkage now defined in claim 1 of the present Application. It should further be noted that the industrial robot disclosed in this reference is not part of, or mounted to, a machine bed.

Pham discloses a pantograph linkage system have two parallelogram linkages arranged side by side, with identical swivel axes. Each of the parallelogram linkages comprises pairs of arms 1 and 2, with arms 2 being longer and a tool holder in the form of a gripping device being mounted at the free ends of the long arms. Due to the different length of arms 1 and 2, tool holder 30 cannot be retracted into a protected position. Moreover, the pantograph system disclosed in this reference is not part of, or mounted to, a machine bed of a gear-finishing machine or a machine of any similar type.

It is thus clear, from the discussion presented above, that there is no reasonable combination of the

teachings of the applied references that would result in a device for the non-contact measurement of the position of the teeth of a workpiece with pre-cut teeth, which device includes, as defined in claim 1, a double parallelogram linkage composed of two linkages between which a swivel plane is located, the parallelogram linkages having identical swivel axes perpendicular to the swivel plane and being connected to move synchronously to one another, together with a holder carrying a probe, the holder being arranged between and connecting the two parallelogram linkages such that the probe is protected by the parallelogram linkages when in a fixed retracted position.

Accordingly, it is submitted that the claims now remaining in this Application distinguish patentably over the references relied upon in the rejection presented in section 6 of the Action.

The claims rejected in sections 7, 8 and 9 of the Action have been canceled.

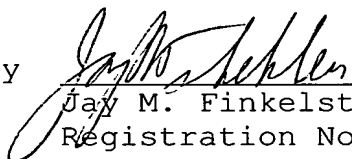
Accordingly, it is requested that all of the previous objections and rejections be reconsidered and withdrawn, that claims 1 and 3-10 be allowed, and that the Application be found in allowable condition.

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If the above amendment should not now place the application in condition for allowance, the Examiner is invited to call undersigned counsel to resolve any remaining issues.

Respectfully submitted,

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